and nose; the purpuric eruption from the onset of the condition, suggests Werlhof's disease rather than acute leukæmia.

From the character of the lymphocytes found in the two blood examinations leukæmia seems excluded. Specimens from three cases of undoubted acute leukæmia examined in the laboratory show the large lymphocytes with "azur-granules" (erythrophilic, but not acidophilic)—Türk's lymphoid marrow cell[1]—in high percentage, and this type of cell was not found in this case, the mononuclear cells being of the lymphocyte and large mononuclear types found in normal blood.

A post-mortem examination was not permitted.

TWO CASES OF CHRONIC SPLENIC ANÆMIA (TWIN SISTERS), ONE WITH ACHYLIA GASTRICA.[2]

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The term splenic anæmia was first used by Griesinger to describe a condition characterized by a severe anæmia associated with chronic enlargement of the spleen. Since Gretsel reported the first case in 1866, an extensive literature has accumulated. An analysis of the cases leads to the conclusion that various diseases have been reported under this name. Some are undoubted cases of pernicious anæmia, others of pseudoleukæmia. In some it would be difficult to exclude malaria, syphilis, and tuberculosis. Banti was the first to make this a primary disease of the spleen. He believes that the enlargement of that organ precedes the anæmia, and that in the later stages the liver becomes cirrhotic; there is jaundice and ascites, eventually leading to death. But whether Banti's disease is a true splenic anæmia, or a cirrhosis of the liver beginning in the spleen, or whether the infantile pseudoleukæmia of von Jaksch belongs in this category, or whether primitive or primary splenomegaly, splenic pseudoleukæmia, Gaucher's endothelioma of the spleen, splenic cachexia, etc., and splenic anæmia are the same thing, or different stages of the same thing, are still mooted questions.

The term splenic anæmia is objectionable, as it assumes a causal relation between the splenic tumor and the anæmia. Objections, however, can be raised against every proposed substitute. In fact, the entire subject is yet in the stage of discussion. Wentworth, in a comprehensive review on the subject, concludes: "That the blood changes in the so-called splenic anæmia are those of a secondary nature." Also, "that it has not been confirmed that the splenic alterations are primary."

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[1] Cells resembling Türk's lymphoid marrow-cells, excepting the "azur-granulation" which Türk states he has not observed in these cells, although he suggests the possibility of the occurrence of such granules in the basophilic protoplasm of an "old" lymphoid marrow-cell. Türk, Vorlesungen über klinische Hämatologie, 1904, p. 366.

Read at the annual meeting of the New York State Medical Society, January 31, 1905.

Rolleston, in a discussion on the pathology of splenic anæmia at the seventh annual meeting of the British Medical Association, said: "The fact that mistakes have been made, and from the difficulties presented by some cases will probably continue to be made, in assuming that splenic anæmia explains the morbid condition present in a given case does not prove that there is not a morbid entity, which, as it conforms to no other known type, must, at present at any rate, be tentatively recognized." Senator, during the same discussion, said: "I am of the opinion that so-called splenic anæmia cannot be strictly separated from similar affections of the hæmopoietic viscera which have a great resemblance to leukæmia without the characteristic condition of the leukæmic blood, and which, therefore, it is justifiable to class together under the name pseudoleukæmia, as Connheim proposed in 1865."

Osler, who has done much to give splenic anæmia its standing, and who has reported 18 cases, says: "A special malady does exist, of unknown etiology, characterized by a chronic course, enlargement of the spleen, anæmia of a secondary type, a marked tendency to hemorrhage of the stomach, and a liability in the late stages to be associated with jaundice, cirrhosis of the liver, and ascites." He also says: "It seems probable that the conditions separately described in the literature as primitive splenomegaly, splenic anæmia, splenomegalic cirrhosis of the liver, or Banti's disease are stages of one and the same malady."

It is my purpose to place on record 2 cases of chronic splenic anæmia occurring in twin sisters. The first case I did not see. I am indebted to Dr. Wallace for the notes. The second case was referred to me by Dr. Wallace. I have had the patient under observation since September.

CASE I.—Mrs. J. H. H. when a child had frequent attacks of pain and enlargement of the joints; otherwise she was well up to her twenty-second year, when she was married. This was in 1892. She then weighed 128 pounds. Within six months her weight dropped to 105 pounds, and her general condition was poor. During 1893 she suffered from chronic diarrhœa and soreness in the left side. In 1895 she gave birth to twins. One child (male) was born dead, the other (female) lived three weeks. When two weeks old, rapidly growing, red, sessile tumors, as large as a hen's egg, formed on the posterior surface of the elbows. There was no rash or other abnormality.

In 1898, while at Grace Hospital, Toronto, where she expected to have a lacerated perineum repaired, an enlargement of the spleen was discovered. Her general condition was poor, and an operation deemed inadvisable.

During 1899 she was anæmic. The ankles were enormously swollen.

Examination February 6, 1900, showed considerable improvement. Her weight was now 130 pounds. The lungs, heart, and pelvic organs were normal.

Abdomen large and distended by a mass which occupied the entire left side, extending below the crest of the ileum, and beyond the middle line. It was hard, smooth, slightly movable, and notched on the anterior border; the liver was not enlarged; there was no ascites.

Urine, cloudy, 1025, acid, large amount of albumin.

Blood, hæmoglobin, 75 per cent.; red corpuscles, 4,320,000; white cells, 850 per cubic mm.

In May, 1900, she had a severe attack of stomatitis. The gums were ulcerated; the submaxillary glands were painful and swollen.

The temperature ranged from 101° to 103°. There was no change in the abdominal findings. The urine was free from albumin.

Blood, hæmoglobin, 30 per cent.; red blood cells, 3,072,000; white cells, 1300. During July and August of that year her condition was wretched. She was emaciated, weak, and had a running temperature. Her death was expected. In the fall she began to improve, and in December she felt quite well and strong, and left the city.

On June 29, 1901, she was in the city for a day. Her condition was fair. Her skin was sallow, with irregular large brown spots. The tumor was about the same.

During the summer of 1902 she passed some renal calculi. In October she had another attack of stomatitis. The submaxillary and cervical glands were painful and enlarged. Her temperature ranged from 100° to 104°. There was some dulness at both apices. Sputum negative. From now on her condition grew worse.

Examination December 22d showed much emaciation. Blood, hæmoglobin, 35 per cent.; red blood corpuscles, 2,100,000; white blood cells, 1200. Differential count, polymorphonuclears, 35.5 mononuclears, 66.5. Sputum negative. She complained of pain in the lower part of the abdomen (right side). There was nausea. The breath was foul. Sputum and stools streaked with blood.

December 27th. During the afternoon she was suddenly taken with excruciating pain in the lower part of the abdomen. The abdomen was tender; pulse ranged from 100 to 140; temperature, 102°.

28th. Gradual failing of the cardiac and respiratory functions. Death occurred at 9.15 A.M.

Autopsy made by Dr. W. H. May at 11 A.M. Body much emaciated, rigor mortis present. There was a little dark yellow subcutaneous fat. The diaphragm reached to the third costal cartilage on both sides.

Chest. Pericardial sac contained about two ounces of fluid. The heart was apparently normal; weight four and one-half ounces. There was no fluid in the pleural cavities; the right lung was adherent at the apex and along the right border. The left lung was slightly adherent.

Abdomen. Full of pus below the mesocolon. No evidence of fat necrosis or venous thrombosis. Small intestine and cæcum injected, matted together, and covered with lymph. Mesenteric glands enlarged. The mucous surface of the alimentary tract apparently normal. Appendix, one and one-half inches long, thick, dark, inflamed, and adherent, but not perforated. Stomach free on both surfaces; no evidence of ulceration. The spleen occupied the entire left half of the abdomen, and was adherent to the diaphragm. It weighed a little over two pounds. There was no pus near it. Right kidney apparently normal; not dilated. It contained a calculus, about the size of an almond; also much sand. The ureter was about the size of the little finger, and about its middle there was a calculus as large as a bean. The left kidney was apparently normal. The suprarenals were small, dark, and friable. The liver was apparently normal. It weighed two and three-quarter pounds. The pancreas and pelvic organs were apparently normal.

Nothing was found to account for the pus, unless it was the appendix. It is safe to assume that it was the result of an acute process and had nothing to do with the chronic condition.

Dr. H. S. Steensland, Director of the Pathological Laboratory of the College of Medicine, Syracuse University, examined sections of the spleen, and reported a marked increase in the amount of reticulum, especially in the splenic pulp, but to a certain extent also in the lymph nodules. Endothelial cells filling the pulp spaces, as observed in the cases described by Gaucher, Bovaird, Harris, and Herzog, etc., were not present.

CASE II.—Miss M., nurse, aged thirty-one years. Father died at sixty-two years of some stomach trouble. Mother is sixty-four years old, and well. Four brothers and three sisters are living and in good health. One sister died at thirty-eight years of peritonitis. One sister (twin) died at twenty-nine years (Case I. of this paper). In 1880 she had measles. From the fourteenth to her seventeenth year she was troubled with lumps or swellings on the hands, knees, and feet. After menstruation set in they almost entirely disappeared. In September, 1898, she had an attack of pleurisy, with effusion. In July, 1898, she had a severe attack of diarrhœa, which lasted about four weeks. At this time she also complained of soreness in the left hypochondriac region. The pain persisted about two months after the diarrhœa ceased. She then entered the training-school for nurses at the Hospital of the Good Shepherd. Hospital work agreed with her. She gained in weight. Her color was good, and she was known as the rosy-cheeked nurse.

In January, 1899, she left the hospital to nurse her sister. In August of that year she had a second attack of soreness in the left side. Dr. W. L. Wallace examined her, but could find no apparent cause for it. The attack lasted some weeks and then disappeared.

For the next two years she was in indifferent health. At times she felt fairly well and strong; at other times she felt run-down and weak, and was forced to keep to her bed. In June, 1902, she again entered the hospital training-school. The work proved too much for her, and, after being on duty for two weeks, she was forced to turn patient, suffering from swelling of the left knee, left elbow, and right large toe. The diagnosis of inflammatory rheumatism was made. After two months' illness she was able to leave the hospital. Change of scene brought about a marked improvement in her condition. About the middle of September she again undertook to nurse her sister. This she did until the latter's death, December 28th. She endured considerable physical as well as mental strain. During 1903 her condition was poor. She was anæmic, had pains in the extremities, also in the left hypochondriac region. She had occasional attacks of diarrhœa. At other times she was constipated and suffered from sharp attacks of colic. She also had several attacks of stomatitis. The gums would become red and swollen. She also had a mild fever during the attacks.

In November, 1903, while visiting in Toronto, Canada, she consulted Dr. Cotton. He examined her, but could not determine any splenic enlargement. He found some thickening in the region of the appendix and advised an operation. This she declined, and returned to Syracuse. Her condition again improved.

In February, 1904, she had an attack of quinsy. The convalescence was very slow. The soreness in the side continued. A blood examination made by Dr. Wallace showed hæmoglobin 70 per cent.; red blood corpuscles, 3,680,000; white blood cells, 3600; differential count, polymorphonuclears, 17.5 per cent.; lymphocytes, 46 per cent.; large mononuclears, 32.5 per cent.; eosinophiles, 4 per cent.

In July she again visited Canada, and again consulted Dr. Cotton, and now for the first time he discovered that the spleen was enlarged, and advised splenectomy.

In October she returned to Syracuse and consulted Dr. Wallace, who kindly referred her to me.

Patient is thin, but not very anæmic. On the face there are a number of irregular brownish spots. The mucous membranes are of fairly good color. Tongue coated.

Lungs normal; heart not enlarged; sounds accentuated, but no murmurs. Pulse of moderate volume; some arrhythmia. The stomach does not reach below the navel. The liver dulness begins at the fourth rib. The lower border is just palpable at the free border of the ribs, but is not enlarged.

The spleen is freely movable, and extends three fingers' breadth below the free border of the ribs. It is firm, smooth, and notched on its anterior border.

The right kidney is freely movable. The left kidney is also movable, but to a lesser degree. None of the glands are enlarged. There is some tenderness over the sternum; none over the other bones.

The blood examination shows a mild anæmia of the chlorotic type. Hæmoglobin, 80 per cent.; red blood cells, 4,800,000; white cells, 1600. The differential count shows polynuclear neutrophiles, 13 per cent.; lymphocytes, 46 per cent.; large mononuclears, 40 per cent.; eosinophiles, 1 per cent. No poikilocytosis; no nucleated reds, but some inequality in the size of the erythrocytes.

A blood count, made October 15th, resulted: Hæmoglobin, 70 per cent.; red blood corpuscles, 4,700,000; white cells, 600. There were so few white cells that it was difficult to make a differential count. It was, however, very evident that the mononuclear cells far outnumbered the polymorphonuclears.

On account of the frequent attacks of diarrhœa, I determined to make an analysis of the stomach contents. She was given the ordinary Ewald test-breakfast, consisting of 300 c.c. of water and 50 c.c. of bread, and the contents aspirated one hour later. The obtained contents formed a thick, gelatinous mass, consisting of much mucus mixed with the food particles. The bread was not well digested. A chemical examination revealed that free hydrochloric acid was entirely absent, the total acidity was 4. There was neither pepsin nor rennet present. Two days later I gave her a test-meal consisting of soup, meat, bread, and vegetables. Four hours afterward the contents were aspirated. The thick, gelatinous mass passed through the tube with difficulty. Macroscopically the various ingredients of the meal could be distinguished. An analysis gave the same result as before. No free hydrochloric acid, no pepsin, no rennet, and a small amount of combined acids.

Since then I have made repeated examinations of the stomach contents, at various times of the day and under varying conditions, and each time with the same result—a complete absence of free hydrochloric acid and the ferments; in other words, a true achylia gastrica.

Repeated blood examinations were also made. The result was always about the same. The red cells varied from 4,100,000 to 4,800,000, the whites from 600 to 2700. The differential counts, likewise, gave similar results. The polynuclear neutrophiles were always in the minority. The highest polynuclear count was 30 per cent.; the lowest 11 per cent. At no time were there any myelocytes or nucleated reds present, nor was there any poikilocytosis. In estimating the white cells the Türk counter was used, the entire chamber, equivalent to nine ordinary Thoma slides, being counted. In the differential counts I followed Türk's classification of the white cells. The transitionals were counted with the large mononuclears, while under lymphocytes, both large and small lymphocytes were included.

These cases present some interesting features. First, the presence of the disease in twin sisters. Bovaird, Brill, Collier, Wilson, Springthrope, and others have reported instances of splenic anæmia occurring in more than one member of a family. Whether this is merely a coincidence or the result of an infection or of some congenital predisposition cannot be positively asserted. Little is known of the etiology of the disease. Micro-organisms have been searched for, but no specific germ has been isolated. The disease resembles a toxæmia. Whether the toxin is produced in the spleen or gastrointestinal tract cannot in the present state of our knowledge be answered. The fact that improvement and even cure have followed splenectomy would indicate that the spleen plays a responsible part. However, it is generally believed that the gastrointestinal tract is the source of the poison.

The marked leukopenia is also noteworthy. In Case II., one count showed but 600 white corpuscles per cubic millimetre. Here, also, the question might be raised; are we dealing with a process of cell destruction or with a disturbance of cell production? We know that hæmolysins and leukotoxins are produced in the blood. But we are not familiar with the production of auto-hæmolysins or auto-leukotoxins. The differential counts in both cases were a little unusual. Ordinarily, in splenic anæmia the differential count shows nothing characteristic. In both of these cases there was a marked relative as well as absolute decrease of the polymorphonuclear cells, and a decided relative increase of the large mononuclear leukocytes.

Another interesting feature is the stomach findings in Case II. We have the condition known as achylia gastrica (Einhorn). The continuous absence of free hydrochloric acid and the ferments in the gastric contents. Achylia gastrica is frequently associated with pernicious anæmia. In fact, the absence of free hydrochloric acid is more frequently associated with this disease than with any other, not excepting cancer of the stomach. The relation of the stomach mucosa to the blood condition has been much discussed. It is safe to say that both are due to the common toxic agent and do not bear the relation of cause and effect to each other. A short time ago Nothnagel called attention to atrophy of the intestinal mucosa as the cause of pernicious anæmia. Faber has recently investigated this question. He concludes that in pernicious anæmia there is no change either in thickness or the character of the intestinal mucosa. He ascribes Nothnagel's findings to post-mortem changes. Whether achylia gastrica is only a coincidence in this case, or whether it is as common with splenic anæmia as with pernicious anæmia, the examination of the stomach contents in other cases will show.

Both cases also show a marked tendency to periods of remission, during which there is a decided improvement of the symptoms. Such periods of remission are quite common in the diseases of the blood-producing organs, like pernicious anæmia, leukæmia, and pseudoleukæmia.

The effect of arsenic in Case II. was rather striking. The patient had at various times taken the drug—each time with a marked aggravation of the symptoms. The lowest white count was encountered while she was taking Fowler's solution. This corresponds with the known physiological action of arsenic, namely, that it stimulates the production of the erythrocytes, while it inhibits the formation of the white cells. Walter Broadbent has called attention to the dangers of the indiscriminate use of arsenic. He believes that many symptoms, like pigmentation of the skin, œdema, ascites, and the sensory disturbances of pseudoleukæmia, leukæmia, and pernicious anæmia are due to the arsenic taken.

The question of operation must be considered in these cases. In some cases splenectomy has brought about a cure; in others it has prolonged life. Knowing the powerlessness of drugs, the knife may be appealed to in suitable cases, even though its use is purely empirical.

A CLINICAL AND PATHOLOGICAL REPORT OF A CASE OF SPLENIC ANÆMIA.

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and

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1. Clinical Report (Dr. Sanford). *Case of anæmia of long duration with gastrointestinal disturbances and pain in splenic region; recent severe and repeated hemorrhages by stool and vomitus following traumata; blood characteristic of secondary anæmia of chlorotic type without leukocytosis, with no general lymphatic enlargement; idiopathic splenomegaly; exploratory laparotomy; subsequent splenectomy; death.* Mr. B. R. T., aged twenty-eight years, married, a farmer, of Greenwich, Ohio, was sent to Lakeside Hospital on the evening of October 14, 1903, with symptoms of vomiting of blood, tarry stools, profound anæmia and a tumor in the lower mid-abdomen.

The patient stated that three weeks before he had been thrown over the head of a spirited horse and had struck flat on his back, but had not been prevented from working about as usual. Two